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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/816,497	03/26/2001	Kumar Subramanian	Kum12Opt.Win	6281

23429 7590 06/27/2003

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EXAMINER

HANDY, DWAYNE K

ART UNIT	PAPER NUMBER
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1743

DATE MAILED: 06/27/2003

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/816,497

Applicant(s)
Smart et al.

Examiner
Dwayne K. Handy

Art Unit
1743



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Jan 2, 2002
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 14-34 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 14, 15, and 19-31 is/are rejected.
- 7) ☒ Claim(s) 16-18 and 33 is/are objected to.
- 8) ☒ Claims 32 and 34 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 20) ☐ Other:

Art Unit: 1743

DETAILED ACTION

Specification

1. The amendment filed 1/5/02 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows:

The paragraphs which contain the brief description of new Figures 2A-2C and the paragraph submitted to describe new claims 19-26. While the original disclosure did mention elements that include a needle, bore and vent, the disclosure did not contain language nor Figures which would support limitations which are now being described in the newly submitted paragraphs. Please see the claim rejections under U.S.C. 112 below as well.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Objections

2. Claims 32 and 34 are objected to because of the following informalities: Claims 32 and 34 are duplicates of claims 16 and 18. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to

Art Unit: 1743

which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 28-31 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The addition of claims 28-31 by amendment includes new matter which was not present in the specification at the time the application was filed. Applicant has stated their belief that these new claims are supported by the disclosure, but the Examiner disagrees. The features in the claims are more limited than the features as they described in the disclosure. In claim 28, applicant has claimed a closure member that "engages the substrate around the periphery of the chamber forming an interface therebetween". In listing support for this claim, applicant has referred the Examiner to page 7, lines 16-17, which states the two window device "can be fabricated from two wafers where the cuvettes are bonded together in registration". This passage does not mention specifically where the closing member meets the interface, nor does it recite any interface formed between the chamber periphery and the closure member. This feature is also not shown in originally submitted Figures 1A-1D.

In claims 29 and 30, applicant has placed limitations on the structure of the a needle element, a bore, and an exhaust vent which extend beyond the original disclosure as well. In the passages cited by applicant as support for the new claims, the disclosure only mentions the existence of the needle and bore elements. There are no structural features described for these

Art Unit: 1743

elements past "fine and short" for describing the needle. Therefore, the Examiner believes that the limitations of claims 29 and 30 which place the needle, bore, or vent in specific locations were not disclosed in the original specification and constitute new matter.

Drawings

5. The Examiner also objects to the new Drawings submitted 1/2/02. Like the claim features discussed above, the new drawings (Figs. 2A-2C) contain features which were not present in the original disclosure and therefore are considered new matter.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Art Unit: 1743

7. Claims 14, 15, 19, 20, 22, 23, 27 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Muller et al. (5,285,131). Muller et al. teaches a vacuum-sealed incandescent light which includes a micromachined chamber sealed by a transparent silicon nitride film. The device is best shown in Figures 1 and 2 and described in columns 2-3. From column 3:

(8) FIG. 2 shows a cross section of the actual device. In this structure, the incandescent filament 12 is placed between an anisotropically etched silicon V-groove 20 in substrate 18 and a low stress silicon-nitride window 16 that is transparent to the filament black-body radiation. The window hermetically seals the cavity 14 at the time of the deposition of silicon nitride. In this structure, the V-groove silicon walls 21 and 22 are partial reflectors for the filament radiation. The maximum depth of the V-groove is approximately 20 to 25 μm .

(9) Silicon is transparent for wavelengths longer than 1.1 μm reflecting for shorter wavelengths; therefore it is not a good mirror for infrared radiation. The infrared reflectance of the silicon walls can be improved if they are heavily doped. We expect that the wall reflectance can also be improved by the deposition or growth of a thin SiO_2 film.

(10) The thermal radiator may be a p.s.p. polysilicon filament. The filament 12 may be coated with low-stress silicon nitride. The conductive polysilicon and insulating silicon-nitride coating may be 0.9 to 1.1 μm and 0.3 to 0.5 μm thick, respectively. Filament lengths from 110 to 510 μm (in 40 μm intervals) may be made in a single wafer run. Silicon-nitride coated filaments can operate at higher temperatures than uncoated filaments, since the melting point of silicon nitride is 220K (compared to 1900K for silicon). Thus, even if the silicon filament melts, it is held in place by the silicon-nitride "skin" or protective layer that encloses it.

(11) In operation, the filament is electrically heated until it glows. The maximum achievable temperature is determined by the decomposition rate of silicon nitride and the expected lifetime of the microlamp. Studies conducted on bulk silicon-nitride samples show that the vaporization rate of silicon nitride starts to be significant at 1900K, corresponding to a peak in the spectrum of the emitted radiation of approximately 2 μm .

(12) The window material, silicon nitride, is transparent to wavelengths between 0.28 and 8 μm . Thus, the window transmits most of the radiation emitted by the incandescent filament. The window must be thick enough to undergo negligible deflection due to the pressure difference between the chamber and the outside environment. A window thickness of 2.5 to 2.8 μm is adequate for this purpose.

Art Unit: 1743

As disclosed in column 3, the device contains a silicon substrate with a chamber covered by a silicon nitride film. The silicon nitride film ranges from 2.5-2.8 micrometers in thickness.

8. Claims 14, 15, 19-23, and 26-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Orloff et al. (US 2002/0160520). Orloff teaches a silicon nano-collection device. The device is comprised of an etched silicon device having top and bottom members which form an inlet, and analytical region, and a vent (Abstract). The embodiments of the device that are most relevant to the rejected claims are best shown in Figures 2 and 6 and described on pages 3 and 4.

Starting on page 3:

[0034] FIG. 2 shows an exploded perspective view of the nanocuvette. In this view the bottom member (5) is well illustrated. The bottom member (5) is fabricated from silicon and has a proximal end (6), a distal end (7) and an etched region (8) forming a capillary channel disposed between the proximal and distal ends. The etched region (8) has an inlet portion (9), an analytic portion (10), and a vent portion (11). The bottom member (5) may range in size from 3 mm-8 mm in length (preferred 3 mm), 1 mm-5 mm wide at the distal end (7) (preferred 2 mm), 50 .mu.m-5 mm wide at the proximal end (6), and 100 .mu.m-1 mm thick. The etched region (8) may vary from 20 .mu.m-150 .mu.m deep, 15 .mu.m-200 .mu.m wide at the inlet portion (9), 500 .mu.m-2 mm wide at the analytic portion (10), and 100 .mu.m-500 .mu.m wide at the vent portion (11). The preferred body dimensions for the bottom member (5) are 3 mm long, 2 mm wide at the distal end (7), 50 .mu.m wide at the proximal end (6), and 350 .mu.m thick. The preferred dimensions for the etched region (8) are 50 .mu.m deep, 30 .mu.m wide at the inlet portion (9), 1 mm wide at the analytic portion (10), and 200 .mu.m wide at the vent portion (11)....

[0047] In another embodiment of the invention the nanocuvette may be designed for use with an optical transmittance assay. Referring to FIGS. 5-6, in this application the bottom member (5) may be constructed similarly with the same embodiments and dimensions as described for the electrochemical and reflectance application above. However, in this embodiment the bottom member (5) additionally includes an optically transparent window (20). The optically transparent window (20) may be formed from various thin films including but not limited to silicon nitride, silicon oxide, and polyimide. The film may have a thickness in the range from 2-5 .mu.m.

Art Unit: 1743

Orloff, then, teaches a device comprised of a silicon substrate with two sides and a window made of silicon nitride formed over a chamber. Substrate and window dimensions that are cited in Orloff are within the ranges of applicant's claims.

Inventorship

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103© and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1743

11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orloff et al (US 2002/0160520) in view of Smithgall (3,597,046). Orloff, as described above in paragraph 8, teaches every element of claims 29-31 except for the antireflective coating. Smithgall teaches an optical system with a lens that is coated with magnesium fluoride to "eliminate reflections within the lens and specular reflections from without" (col. 3, lines 1-4). It would have been obvious to one of ordinary skill in the art to add the coating of Smithgall to the window in the device of Orloff. Orloff teaches optical analysis of materials contained in a chamber covered by a window. One would add the antireflective coating to prevent reflection of the light used to analyze the materials through the window.

Art Unit: 1743

13. Claims 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Orloff et al. (US 2002/0160520) in view of Smart et al. (5,801,057). Orloff, as described above in paragraph 8, teaches every element of claims 29-31 except for the needle and bore elements. Smart teaches a microsampling device which has a sampling needle formed as an etched bore in silicon as an integral part of their device (col. 4, line 63). The needle is used to directly obtain samples that are drawn into the sampling chamber of the device. IT would have been obvious to one of ordinary skill in the art to combine the needle and bore features of Smart with the device of Orloff. Both devices are used in sampling and analysis. The addition of the needle element from Smart would allow for the direct acquisition of blood from either a patient or from vacuum tubes which are commonly used in the collection of blood.

Allowable Subject Matter

14. Claims 16-18 and 33 allowed.

15. The following is a statement of reasons for the indication of allowable subject matter. In claim 16 applicant has claimed a method of making a window in a silicon cuvette comprised of the following steps; providing a silicon substrate with a top and bottom surface, etching a depression in the top surface to define a chamber, depositing a silicon nitride film on the top surface and in the chamber, and etching a depression in the bottom surface in registration with the chamber in the top surface to expose the silicon nitride film through the bottom surface. The

Art Unit: 1743

closest prior art references found by the Examiner are Holmen et al. (4,784,721) and Loeppert et al. (5,870,482). These references teach the deposition of a silicon nitride on a top side of surface and then etching through the bottom surface to expose the bottom side of the silicon nitride film, but they do not teach the steps of etching a depression on the top surface to form a chamber or the deposition of silicon nitride into said chamber.

Conclusion


16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Holmen et al. (4,784,721) and Loeppert et al. (5,870,482). These references teach the deposition of a silicon nitride on a top side of surface and then etching through the bottom surface to expose the bottom side of the silicon nitride film. Muller et al. (5,493,177) teaches a micromachined device for making thermionic emission vacuum tubes. Wei et al. (5,925,479) shows a transparent silicon nitride film used in a battery display/testing case. Weckstrom et al. (5,668,376) displays a radiation source assembly for optical transducers that utilizes clear silicon nitride film. Yoo et al. (5,578,517) and Tanaka (5,005,058) show microfluidic devices which contain clear silicon nitride films as protective layers. Bruck et al. (5,358,746) teaches methods of making optical moldings from silicon nitride. Zdeblick (5,074,629) shows a variable focal lens integrated into a silicon wafer.

Art Unit: 1743

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dwayne K. Handy whose telephone number is (703)-305-0211. The examiner can normally be reached on Monday-Friday from 8:00 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill Warden, can be reached on (703)-308-4037. The fax phone number for the organization where this application or proceeding is assigned is (703)-772-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)-308-0661.


Jill Warden
Supervisory Patent Examiner
Technology Center 1700

dkh

June 18, 2003